<div align="center">REMARKS</div>

Claims 1-13, 15, 16, 18-22 and 25-35 will be pending upon entry of the present amendment. Claims 1-12 are amended, and claims 23-35 are newly submitted.

Applicant thanks the Examiner for indicating the allowability of claims 13, 15, 16, and 18-22, and for indicating the allowable subject matter of claims 5 and 10-12. Accordingly, new independent claims 26 and 33 are submitted, having substantially the limitations of claims 5 and 10, respectively, although the limitations of intermediate claim 9 are not included in new independent claim34 .

The Examiner has rejected claims 1-4 and 6-9 under 35 U.S.C. 102(b) as being anticipated by Cohen et al. (US 5,672,948, hereafter *Cohen*). In the remarks that follow, when citing to specific text from Cohen, column numbers and line numbers will be separated by a colon, e.g. 4:22.

Claim 1 has been amended to incorporate a portion of the subject matter of claim 2, and now recites, in part, "enabling the bi-directional counter around an expected zero-crossing of said back electromotive force with a counting window having an arbitrary duration." Cohen fails to anticipate at least this limitation of claim 1. In rejecting claim 2, which originally included this limitation, the Examiner cites Cohen's specification at column 8, lines 17-56. This passage states,

> The final count or phase information on line 204 is essentially used to adjust the initiation frequency of the commutation states. For example, the commutation states (A-F) may change with an initial frequency of 1000 counts of the microprocessor clock between each state. However, if a final count of the up/down counter is greater than zero then this indicates that there is a leading voltage on the coil and the initial count of 1000 is increased such that the time between commutation state switches will be longer in order to put the neutral or zero crossing of the field coil and the rotor in sync. In the same respect, if a negative final count is detected then the frequency of initiation of the commutation states is increased by lowering the initial count from 1000 to a lower number so that the lagging coil voltage will speed up to match the rotor field voltage. This frequency or counter adjustment is output on line 208 to motor 210 where the frequency of commutation is adjusted accordingly. The frequency output on line 208 is also fed back to phase detect 202 on line 212. And, the frequency of the motor is fed back to phase detect 202 on line 214.

Nothing in this passage makes direct reference to the duration of a counting window. The frequency of commutation referred to is controlled by the number of clock pulses, or counts, during which a given commutation state lasts before microprocessor-controlled switches switch to the next state (see also 4:38-42). This is also referred to as the frequency of initiation (see, for example, 6:55 and 7:3). Both terms refer to the frequency at which new commutation states are initiated, which is controlled by the number of clock pulses allotted to each state. In contrast to the method claimed in claim 1, the length of the counting period of the up/down counter is exactly equal to the length of a commutation state (see, for example, Figures 3A-3C, and 5:6-8). Elsewise, Cohen's system could not function properly. Clearly, if the counting period is strictly tied to the commutation state, it cannot also be arbitrary in length. Accordingly, Cohen cannot anticipate claim 1, which is allowable thereover. Dependent claims 2-12 are also allowable as depending from an allowable base claim.

Claim 30 includes substantially all the limitations of claim 8 and base claim 1 in independent form, and recites, in part, "varying a counting frequency of the counter during various driving phases of the motor." Cohen fails to anticipate this limitation. In rejecting claim 8, the Examiner cites text at 3:21, which refers to an up/down counter frequency adjustment. However, this passage is not referring to an adjustment of the counter frequency, but rather, to a frequency adjustment through the use of an up/down counter. While the summary portion cited by the Examiner does not provide any details, and thus can be misunderstood, the detailed description is more clear. For example, column 6 describes how the up/down counter arrives at a final count (positive, in the example described), then states "This positive final count 129 is used to decrease the frequency of initiation of the commutation states to eliminate the leading voltage to better align the field coil voltage and the rotor ..." (see 6:54-56). Thus, the counter frequency is not adjusted, but instead is used to adjust the frequency of initiation.

Most importantly, what Cohen refers to as a change or adjustment of frequency does not refer to a change of a clock speed, for example, or a rate at which a counter is incremented, but rather to a change of a number of clock pulses during which a given commutation state lasts. In Cohen's example quoted above from column 8, a commutation state has an initial duration of 1000 "counts of the microprocessor clock." An up/down counter counts

clock pulses during the entire length of two of the six commutation states of the motor. If, at the end of the second of the two count periods, the up/down counter is at a value above or below zero, the frequency of commutation is adjusted by adding or subtracting from the 1000 pulses during which each commutation state endures. When the frequency of commutation is adjusted as described above, the length of each commutation state is changed, since the clock rate multiplied by the count controls the timing of the switches between commutation states. There is no change of the clock rate; only changes of the number of clock pulses per state. Clearly, claim 30 is allowable over Cohen, together with dependent claim 31.

Claim 32 includes substantially all the limitations of claim 9 and base claim 1 in independent form, and recites, "using a value assumed by the counter at an end of *each* counting window in formulas to estimate an instantaneous position of the rotor, a period between two zero-crossings, and a speed of rotation." (Emphasis added.) Cohen fails to anticipate this limitation of claims 9 and 32. Cohen's process utilizes the combined counts made during two commutation states (A and D) to synchronize its system. During the first state (A), the up/down counter counts down while the back EMF voltage is above zero (see 6:8), but during the second state (D), the up/down counter counts up while the back EMF voltage is above zero (see 6:24, 25). Neither count can be used alone, inasmuch as they count in opposite directions. It is only after the *final count* is arrived at, that the frequency of initiation is adjusted. "This positive final count 129 is used to decrease the frequency of initiation of the commutation states ...." (6:54, 55). Because Cohen clearly teaches making appropriate corrections only after the two commutation states, it cannot be construed to anticipate a claim the recites estimating characteristics of a rotor after each counting window. Accordingly, claims 9 and 32 are each allowable thereover. Claim 33, depending from claim 32, is also allowable.

New claims 25 and 26 depend from claims 22 and 21, respectively; new claims 28 and 29 depend from claim 27, which includes subject matter of claim 5, written in independent form; and new claim 35 depends from claim 34, which includes subject matter from of 10, written in independent form. Each of these new claims depends from a claim that was either allowed or indicated as including allowable subject matter by the Examiner. Accordingly, these new claims are allowable as depending from allowable base claims.

Applicant believes that all the currently pending claims are now in condition for allowance. The Examiner is encouraged to contact Mr. Bennett by telephone at (206) 694-4848 to discuss the above and any other distinctions between the claims and the applied references, if desired. If the Examiner notes any informalities in the claims, he is encouraged to contact Mr. Bennett by telephone to expeditiously correct such informalities.

The Director is authorized to charge any additional fees due by way of this Amendment, or credit any overpayment, to our Deposit Account No. 19-1090.

Respectfully submitted,

SEED Intellectual Property Law Group PLLC

/HHB/

Harold H. Bennett II
Registration No. 52,404

HHB:wt

701 Fifth Avenue, Suite 6300
Seattle, Washington 98104-7092
Phone: (206) 622-4900
Fax: (206) 682-6031

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